INDIANA Local Technical Assistance Program

Roundabout Maintenance Flipbook

SP-30-2016

PURDUE
ENGINEERING

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2016

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Acknowledgements

We would like to acknowledge all those who completed our survey. Your invaluable insight informed our understanding of how roundabouts are maintained. Further, we would like to thank the City of Carmel for taking the time to share their best practices, adjustments made based on experience, and maintenance specifications and schedules. This manual would not have been possible without the knowledge and first-hand experience of all those who participated.

Introduction

This flipbook is a summary of the work published in the *Roundabout Maintenance Manual* by Indiana LTAP. This information was collected through a series of interviews with city engineers, public works directors, and street commissioners experienced in roundabout maintenance. It serves as a model to guide work crews in correct maintenance procedures.

Winter Maintenance

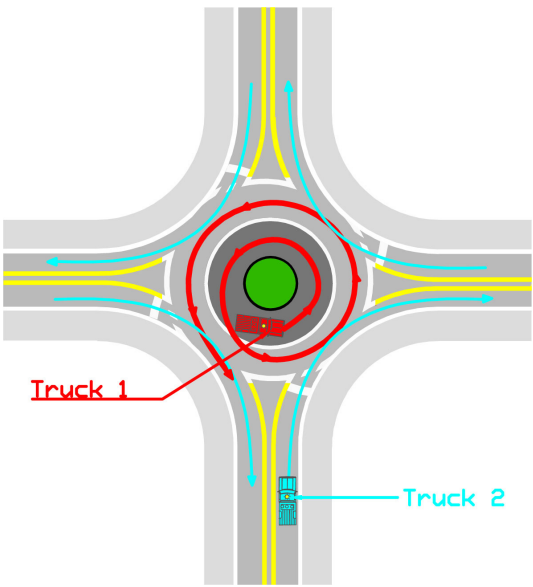
Many of the issues associated with maintaining roundabouts stem from questions on clearing and storing snow, as well as how to de-ice the circulatory roadway. This section will give details on proper winter maintenance.

Snowplowing

The best method for snowplowing requires two trucks. The first truck starts in the center of the roundabout. If a clear truck apron is desired, begin by plowing that area first. The truck should then circle the roundabout, counterclockwise, gradually plowing all the snow to the outside. Several rotations may be needed to clear the roundabout of snow. Once the center is clear, snow should be removed from the approaches, pushing all the snow outside the roundabout.

Do not pile snow in central islands or splitter island(s). If there are excessive amounts of snow, it may be necessary to plow onto the sidewalk and push the snow further back.

Diagram for Proper Snow Removal



De-Icing

Salt treatments are the most effective method for de-icing roundabouts. Liquids may still be used; however, it is suggested that they are combined with granular treatments. Excessive use of salt may cause damage to vegetation and pavement; however, this problem is to be expected on any roadway.

Equipment

Some communities noticed wear on their plows along the passenger side. The constant turning while plowing roundabouts puts more stress on the passenger side of the vehicle and results in extra wear. Wearing can be tempered by installing stronger springs in the passenger side.

Tires on the passenger side of vehicles also wear out faster when driven through roundabouts frequently. Rotating the vehicle tires more frequently can temper this maintenance concern.

Summer Maintenance

Summer Maintenance concerns for roundabouts include placing and maintaining landscaping. This section discusses proper placement of landscaping, as well as methods for working in the central island and splitter islands.

For work zone setup for the following maintenance activities, refer to the Access During Maintenance section of this guide.

Landscaping

The following are general suggestions for roundabout landscaping. For detailed landscaping guidelines, consult the owner or the designers.

In central islands of roundabouts with entrance speed over 40 mph, large trees (diameter over 4 inches), rocks, statues, and other large features are discouraged. Small trees and shrubs in the central island, however, can be aesthetic and beneficial; they block views straight across the roundabout, which decreases speeds and directs drivers' sight to the left.

To avoid obstructing drivers's views, splitter islands should contain low landscaping. Shrubs lining the crosswalk are encouraged to highlight its location to both motorists and pedestrians.

Central Island

When landscaping maintenance is needed for the central island, trucks can park on the truck apron, but keep in mind when planning the work zone setup that you may be blocking the passage of large trucks who need to use the apron. If there is a truck inset available, park there. Ensure that the truck's placement does not block motorists' sightlines.

Treat each intersection individually. Take into consideration traffic flow and time of day. For example, if during maintenance times most traffic flows east to west, park the truck on either the north or south side of the central island.

Splitter Islands

Landscaping maintenance in the splitter islands should be treated like a traditional median.

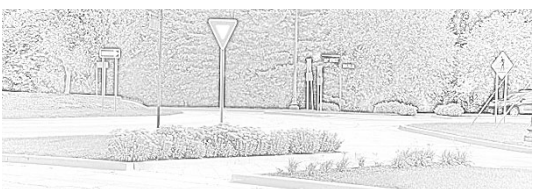
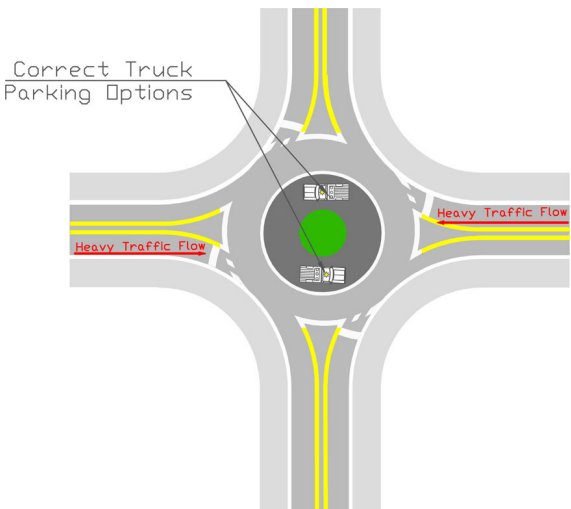


Diagram for Maintenance Truck Placement



Pavement Maintenance

This section will review guidelines for proper pavement maintenance procedures. It is important to keep the roadways within and leading up to roundabout intersections in good conditions for motorists.

Street Sweeping

Street sweeping clears away debris and dirt on the outer edges of a roundabout. This cleaning should be completed once every year. Street sweeping also clears the intersection of rubber build-up from tires, which can cause the pavement to smooth over and reduce traction. Using steel bristle brushes with the sweeper can remove this rubber.

Pavement Markings

The two main choices for striping in a roundabout are paint or thermoplastic markings. Either are effective methods. Paint does not last as long as thermoplastic; however, it is less expensive. Keep in mind that paint lasts around six months and thermoplastic lasts for about a year, and plan appropriate maintenance schedules accordingly.

If the pavement markings in a roundabout have completely worn away, consult the as-built plans to correctly re-stripe them.

When re-striping the centerline of a multi-lane roundabout, have crews park on the inside lane and close it off. Work from the inside lane to update the center line.

Cleaning Truck Aprons

Truck aprons should be cleaned either twice yearly, or when the concrete is being resealed. This cleaning removes tread marks from trucks driving on the apron. A power-washing crew should clean off the apron with hand-held pow-ers washers.

Other Pavement Maintenance

Filling potholes and repairing curbs should fol-low the same procedures as those for a regular roadway or intersection.

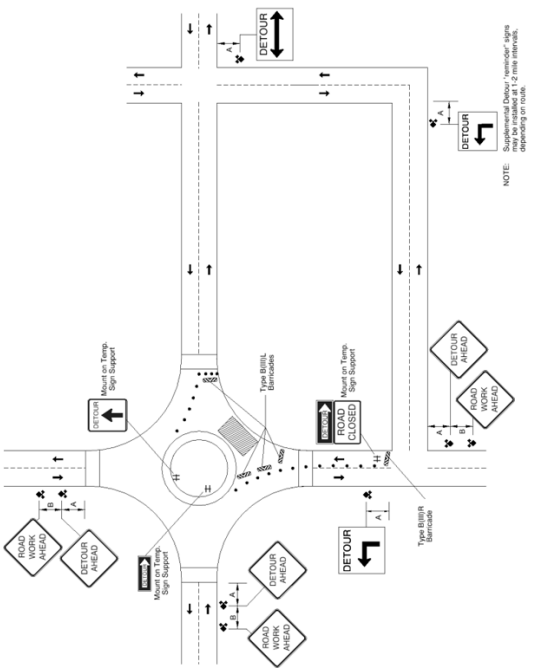
Access During Maintenance

Maintenance procedures may require work zone setup. This section summarizes Temporary Traffic Control setups collected from various sources. Indiana LTAP is not liable for any information, as it has all be references from other sources.

Detouring Traffic

Detours should be utilized if there is long-term work that will block the circulatory roadway. In the event a detour is necessary, place detour warning signs well in advance of the intersection and note the street name of the detour. Other signs should be placed as per MUTCD standards. Be sure to alert emergency personnel prior to setting up a detour for the intersection.

Diagram for Detouring Procedure in a Roundabout



Work Zone Setup Information

When setting up any type of work zone for a roundabout, be sure to maximize the sight distance for the flagger and transitions. In general, there should be a clear line of sight from the flagger symbol sign to the flagger.

Remember to accommodate for the turning radius of tractor trailer vehicles and other large vehicles when installing channelizing devices and other traffic control.

***Section headings marked with an asterisk (*) signify that the material is reprinted from Indiana LTAP's* Concise Handbook for Temporary Traffic Control (2016).**

Tapers*

Merging Taper

A merging taper requires the longest distance because drivers are required to merge into common road space. A merging taper should be long enough to enable merging drivers to have adequate advance warning and sufficient length to adjust their speeds and merge into an adjacent lane before the downstream end of the transition.

On the next page is a table of merging taper lengths (L) and the maximum spacing of channelizing devices for various speeds and widths of closing.

Taper Length♦

Speed Limit (mph)	Lane Width (Feet)			Max. Spacing of Devices (Feet)
	10	11	12	
25	105	115	125	25
35	205	225	245	35
45	450	495	540	45
55	550	605	660	55
65	650	715	780	65

♦ *Following are the formulas used to calculate taper length:*

Posted Speed	*Formula*
40 mph or under	$L = WS^2/60$
45 mph or over	$L = WS$

where: L = taper length in feet; W = width of offset in feet; and S = posted speed limit, or off-peak 85th percentile speed prior to work starting, or the anticipated speed in mph.

Shifting Taper

A shifting taper is used when a lateral shift is needed. A shifting taper should have a length of 0.5L.

Shoulder Taper

A shoulder taper may be beneficial on a high-speed roadway where shoulders are part of the activity area and are closed, or when improved shoulders might be mistaken as a driving lane. Shoulder tapers should have a length of at least 0.33 L.

Downstream Taper

A downstream taper should have a minimum length of 50 feet and a maximum length of 100 feet with devices placed at a spacing of approximately 20 feet.

One-Lane, Two-Way Taper

A one-lane, two-way taper is used in advance of an activity area that occupies part of a two-way roadway in such a way that a portion of the road is used alternately by traffic in each direction. A one-lane, two-way taper should have a minimum length of 50 feet and a maximum length of 100 feet with channelizing devices at approximately 20-foot spacings.

Flagging*

A flagger shall be a person who provides temporary traffic control. A flagger should be able to demonstrate the following abilities:

1. Ability to receive and communicate specific instructions.
2. Ability to move and maneuver quickly.
3. Ability to control signaling devices.
4. Ability to understand and apply safe traffic control practices.
5. Ability to recognize dangerous situations and warn coworkers.

Advance Warning Area♦

Suggested Advance Warning Sign Spacing

Road Type	Distance Between Signs (in feet)		
	A	B	C
Urban (low speed)	100′	100′	100′
Urban (high speed)	350′	350′	350′
Rural	500′	500′	500′
Expressway/Freeway	1,000′	1,500′	2,640′

Maximum Spacing of Channelizing Devices *(in feet)*

Road Type	Taper	Buffer/Work Space	Downstream
Two-lane	20′	2 x Speed Limit	20′
Multi-lane	Speed Limit	2 x Speed Limit	20′

Tapers and Flagger Station Distances (*in feet*)

Speed Limit (mph)	Two-Lane	Multi-Lane ♦♦			Flagger Station/ Buffer
	Max. Two-Way Taper *	Merging Taper 12′ lane	Shifting Taper 12′ lane	Shoulder Taper 10′ shoulder	
20	100′	80′	40′	25′	115′
25	100′	125′	65′	35′	155′
30	100′	180′	90′	50′	200′
35	100′	245′	125′	70′	250′
40	100′	320′	160′	90′	305′
45	100′	540′	280′	150′	360′
50	100′	600′	300′	170′	425′
55	100′	660′	330′	190′	495′
60	100’	720’	360’	200’	570’
65	100’	780’	390’	220’	645’

♦ Refers to a one-lane, two-way traffic taper.
♦♦ Multi-lane layouts use buffer zones instead of flagger stations
Note: Downstream taper = 100 feet

Typical Application Diagrams*

The diagrams on the following pages represent examples of the application of principles and procedures for safe and efficient temporary traffic control in work zones. The layouts represent minimum requirements.

It is not possible to include illustrations to cover every situation which will require work area protection. These illustrations are not intended as a substitute for engineering judgment and should be altered to fit the conditions of a particular site. All traffic control devices used must be in compliance with your state's MUTCD.

Guidelines for taper lengths are given. Refer to pages 12-15 for more specific information on taper lengths. For further information, refer to your state's MUTCD.

Typical Application Diagrams Legend*


Arrow board


Arrow board support or trailer (shown facing down)


Changeable message sign or support trailer

Channelizing device


Crash cushion


Direction of temporary traffic detour


Direction of traffic

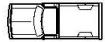

Flagger


High-level warning device (Flag tree)


Longitudinal channelizing device


Luminaire


Pavement markings that should be removed for a long-term project


Shadow vehicle


Sign (shown facing left)


Surveyor


Temporary barrier


Temporary barrier with warning light

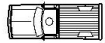

Traffic or pedestrian signal


Truck-mounted attenuator


Type 3 barricade

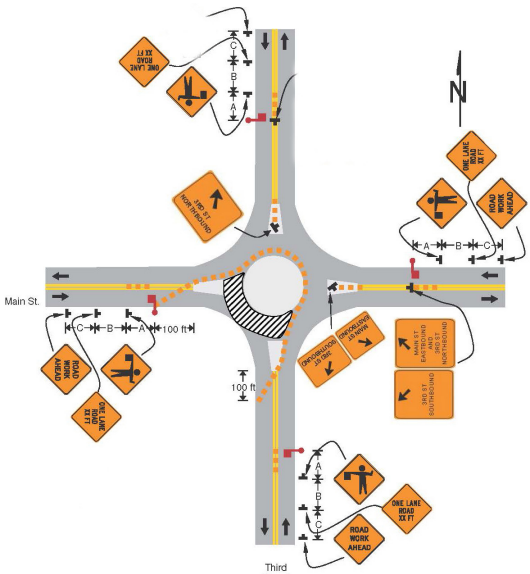

Warning light


Work space


Work vehicle

Closure Blocking Circulatory Roadway

For closures that will stop the flow of traffic through the roundabout, including either-lane closure in a single lane, or multi-lane closure in a multi-lane, work zone setup along with a flagger crew is necessary. Some traffic must be directed through the roundabout in a clockwise direction. Traffic should be stopped on all approaches, with traffic being released from each approach one at a time, alternating through each entrance.

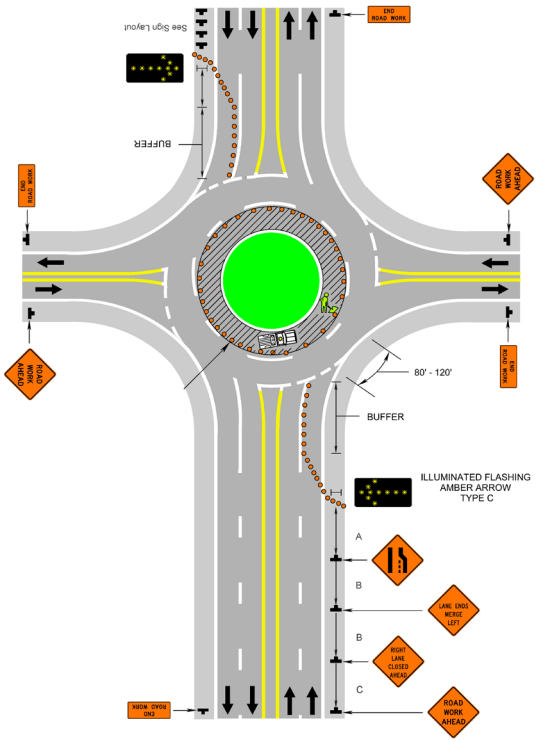


Partial Closure of a Multi-Lane Roundabout

Some maintenance procedures require only the closure of one lane in a multi-lane roundabout. Either the inner or outer lane can be closed with the intersection still fully functioning as a single lane roundabout. For this type of closure, merge all traffic down to one lane before entering the roundabout. Take extra care when closing the outer lane on the entrances and exits to make sure not to block sightlines for drivers.

Refer to the diagram below for instructions.

Diagram for Partial Closure of a Multi-Lane Roundabout



General Access Information

The best times for roundabout maintenance are generally between 9:00 a.m. and 3:00 p.m. This time block may vary by locality, however. Peak traffic times should be avoided for maintenance. Several maintenance tasks for roundabouts can be done at night, including street repaving and striping.

Pedestrians and bicyclists must also be considered when setting up work zones. There should be a clear, safe path for pedestrians through any work zone. If a safe path through the intersection is not possible, pedestrian and bicycle traffic should be detoured.

Contact Information and Training

For further information regarding roundabout care, pavement maintenance, basic work zone traffic control, and roadway maintenance topics, contact the Indiana LTAP Center. Indiana LTAP is a program of Purdue University's Lyles School of Civil Engineering and is funded as a Local Transportation Assistance Program by the Federal Highway Administration.

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Indiana LTAP provides technical assistance and training to the highway, road and street departments of all counties, cities and towns in Indiana that are responsible for over 80,000 miles of roads and over 12,000 bridges.

Indiana LTAP works hard to serve city and town street departments, county highway departments, city and county engineering departments, city mayors and town managers, county commissioners, county surveyors, MPOs and RPOs, police departments, consultants, and contractors.

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